Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

LIBRARY
RECEIVED
JUN 11 1925
U. S. Department of Agriculture

MONTHLY REPORT OF THE OFFICES OF FOREST EXPERIMENT STATIONS AND DENDROLOGY

MAY 1925

GOVERNMENT PRINTING OFFICE 8—5156

MONTHLY REPORT OF THE OFFICES OF

FOREST EXPERIMENT STATIONS AND DENDROLOGY

May, 1925

RS
Reports
Monthly

MONTHLY REPORT

OFFICES OF FOREST EXPERIMENT STATIONS AND DENDROLOGY

May, 1925

Foreword

The Administration of Experiment Station Work

E. W. Allen (U. S. D. A.)
(Continued from the April Report)

We hear much of academic freedom in station work, and emphasis is rightfully laid upon it. But no man can expect absolute freedom of action in a public-supported institution, and particularly until he has demonstrated his title to it. It is not a thing to be extended to every new worker but is something to be won through confidence in ability and dependability. Many of our station men are not fitted by preparation or experience to work independently, but they need guidance, supervision, and control for their own good as well as that of the station. Proper administration will provide it.

The dominant idea of the project system of administration is that profitable station work lies along definite lines of endeavor, which deserve continuity and concentration of effort upon them; and that these should not be cramped or rendered ineffective by lack of reasonable funds.

A station's activities are limited definitely by the amount of its funds and the measure of economy exercised. The amount of money a station has bears a very definite relation to what it can afford to undertake.. This does not always seem to be considered by those in authority, as evidenced by the number of projects and the starting of new ones when funds are already low. The cost of a project and the status of the funds are important considerations in passing upon new work, for unless the funds available are adequate the inauguration of new work is not expedient, and unless sufficient funds can be assigned to a new project to make it effective it would better wait. The amount of money named for a project is often so small as to make any serious work impossible. The result is an inefficient use of funds which might far better have been turned over to some other needy project.

Taken collectively, the list of projects comprises the program of the station for the time being - the catalog of its various undertakings, the things which must be provided for out of the annual revenues. After certain "overhead charges" have been accounted for, such as general administration, maintenance of buildings and grounds, publications, etc., which

apply to the station as a whole, the balance is accounted for by the projects. These, therefore, enable a budget to be made up, with the funds distributed on the basis of actual requirements of the work instead of the indefinite one of what the departments might use. A lump sum allotment to a department based on anything short of a group of accepted projects encourages extravagance, often leads to the carrying of features which might well be concluded, and promotes strife between departments. Not the amount of money allotted but the use made of it is the measure of efficiency. No station man is entitled to funds beyond those which he can show a need for or his ability to use profitably. Unless he can outline his proposed undertakings in a manner to pass scrutiny and receive approval, constructive work can not be expected and the prospect does not justify authorizing expense.

The fact that projects need modification or amendment from time to time is no argument against the plan, but emphasizes the advantage of revision and review in keeping the program an active one and up to date. Merely because a project was approved as giving promise at one stage does not justify its continuance in a routine way year by year without mark of advancement. Projects which have never progressed beyond the preliminary stages have sometimes been granted generous allowances year after year, because they have not been subjected to critical review. A dead or inactive project has no claim upon the funds, and there is doubtful expediency in continuing support to one which has clearly reached a standstill.

Without advocating an elaborate and exact system of cost keeping by projects, it is felt that efficient administration requires some consideration of the approximate cost of various features. This enables a better understanding of just where the station's money is being spent and the determination of the relative importance of retaining particular features permanently. Lines of work are of course not to be selected merely because they are cheap, but because they promise to throw new light, establish new facts, or contribute to the knowledge and understanding of a subject. Some features are apparently more desirable and profitable than others, but less deserving ones sometimes appear to be carried from force of habit and because they have not been weighed critically and their cost is not realized. While it is the business of the station to spend money, it is its trust to spend it economically and to the best purpose. This is doubtless the desire of every director, but how can he know it is being done unless he knows in a general way the cost of various kinds of work?

In research the cost can not be counted, and its justification and the estimate of economy are found in the progress which is being made or the promise of it. In some of the simpler conventional forms of experiment the question of cost in relation to return may well be looked into. In some instances such features appear to be absorbing a relatively large proportion of the station funds, and not to be giving an output commensurate in importance with their cost. The cost of such features to the station is n

alone the money outlay but includes the time and energy and ambition of the men. If we get these matters down in black and white it will be easier to judge whether a given effort is warranted and if not to raise its grade. Unless there is some fairly reliable basis for consideration, how can it be determined whether or not a wise and profitable use is being made of the funds and resources as a whole? And unless this is known, has the administrative function been fulfilled?

The project system will help materially in drawing the lines, which we are now expected to draw more carefully, between experimental work, or the province of the station, and other classes of effort; in other words, to confine the station within its legitimate field and to preserve that field to itself. The field of the experiment station is a fairly definite one. It is the making of experiments and investigations in agriculture, the accurate recording of observations and results, their study and interpretation, and the dissemination of the information derived. The boundaries between it and advanced teaching on the one hand and extension work on the other can only be fixed in somewhat general terms, but in special cases become administrative questions. Their logical determination is more feasible under a project system which makes these questions specific rather than general.

The station is called upon to make reports from time to time upon its work and expenditures, and the results which have followed. The director must naturally rely upon the workers for the material for such purposes. As a matter of administration, also, he needs progress reports from the men of his staff.

The preparation of such reports is often irksome to the men, but it is beneficial to them as well as informing to the director. The necessity of sitting down quietly and summing up the activities of the year with a view to bringing out the essential features of progress and the plans for the future is far from being a waste of time, and it is a great aid to the director in getting at the exact status of all the work.

Here, again, the project is the natural unit. It aids the worker in preparing a systematic review, and it is a material help to the director in judging of the merits and the progress of the individual features.

To sum up, then, the project plan of administration seems to furnish the most reliable basis for administering the work and the funds of an experiment station, and has proved satisfactory.

It insures more thorough planning.

It enables a proper consideration of new undertakings, before funds are assigned to them.

It provides a record of the station's activities.

It enables the work to be followed up from time to time and to be concluded when it ceases to be profitable.

It assists in defining the scope of station work and in holding it within its proper field.

It tends toward general economy.

It enables a budget to be made up intelligently, in accordance with the needs or relative importance of individual undertakings.

It provides against inadvertently overloading the program of work, so that features of it become ineffective for lack of funds.

It gives an effective basis for discussing and reporting upon the station's work and for explaining the use of its funds.

FOREST EXPERIMENT STATIONS

Washington

At the end of the month we had a very pleasant visit from Mr. P. M. Barr, who is to organize a forest experiment station in the eastern part of British Columbia. Developments in the investigative work there are decidedly interesting. Two forest experiment stations are to be established, one on the west coast at Victoria and one in the East at Prince George. For the first year or two the ~~xxxxxx~~stations will deal particularly with methods of cutting, reproduction studies, and some growth and yield work. The stations are to start in with a staff of only two or three men and expand as the funds become available. A gradual expansion is planned covering the next 10 years. As most of the revenue of the province comes from timber sales, it is expected that the station work will be adequately supported. Barr was much interested in the administrative phases of our experiment stations and is visiting several of them on his way to the West Coast.

For a time it appeared that the Southern Station was moving its headquarters to Washington. Forbes has been here the entire month, and we had visits also from Shivery and Demmon.

The annual Silvical Research Program of the Forest Service has just about been completed and a relatively small amount of work remains before

being mimeographed. It is expected that this will be issued some time in July.

A start was made during the month on an administrative guide as a supplement to the Manual. In it the various policy items which are contained in numerous general letters will be summarized. By having all this material in one place it will enable the stations to find quickly statements upon many of the policy questions which arise frequently.

A rather interesting thing is developing in correspondence which indicates that someone has gotten off on the wrong foot. A number of inquiries have been received from German foresters asking about the work of the forest experiment stations and attempting to get jobs in this country. Apparently also someone has been advertising the possibilities of southern lands for rubber production, for a number of inquiries have come from the southern States asking advice on planting rubber trees.

Statistics

Practically the entire month of the Statistical Section was spent upon the compilation of material for the Senate Committee on the Public Lands. Requests have come in thick and fast for compilations of records put up in different forms. It was necessary to recalculate all of the grazing fees, allotments, and numbers of stock on the National Forests from 1906 to 1925 in accordance with the wishes of the committee.

Measurements

The Committee on Growth and Yield has now gotten comments from all members on the first section of the Manual. The task of compiling them and arranging for bringing them together and reconciling the differences is being tackled.

The two big projects, the southern pine yield study and of the regional western yellow pine volume table, still continue each to take up a third of the time of the Section of Measurements. In the southern pine growth study the data indicate that additional plots are necessary for shortleaf pine as the material so far does not conform to the other species. This will necessitate additional field work on the part of the Southern Station and additional study of what this non-conformity means.

Tabulator

The semi-annual report for Accounts took up 50 per cent of the time in the Section and necessitated overtime work in order to get the material out in the time required. Additional time was spent upon the fire study for the Northeastern, and in the study of lumber distribution being made for the Office of Forest Economics. Putting the southern pine lumber price study on tabulating cards is saving at least 50 per cent of the time formerly devoted to this analysis.

Library

In May there were 1019 books and periodicals drawn from the library, and 123 members of the Service and others consulted the library in person. The librarian indexed 390 books and articles for the card catalogue.

How Big is an Acre?

"I am facing the problem of fencing a square field, 3 sides being on level ground, the fourth side embraces a hill rising 50 feet. The question that rises is, will the side that goes over the hill require more fence posts than any of the other sides (posts placed equal distance apart)? Trusting you can find time to explain what you may rightly term a foolish question, I remain,"

(The above letter was received by the Washington office, and is referred to Mr. McArdle for reply in view of his interest in slope distances.)

EDITOR'S OFFICE

The Preparation of an Outline - III

Most of us have the "wet-paint complex." The sign says "Wet Paint. The surface glistens like wet paint. The workmen are applying wet paint just around the corner. But a horrible doubt assails us; it may not be wet after all! Just a moment! A light rub of the thumb and we'll see for ourselves....Yes. It's wet.

The "wet paint" sign on the editor's desk reads (to quote last month's soliloquy):

> A readable, sound, and convincing report must have an outline, and that outline must be, not a mere synopsis of the report, but a sincere effort to focus and correlate the data in hand BEFORE ANY FORMAL WRITING IS DONE.

This is true whether or not the report is submitted through the Washington office. It is true for the article that you work up in your own time and illustrate with your own photographs and charts and send out unofficially under your own name. This "wet paint sign" might far better be on your desk than on the editor's desk. A highly informal outline, scratched out on the back of an old envelope, is far better than

none at all. The formal outline has no advantage over the scratch-pad outline save that it makes it possible for others to get the focus on your data with you and to help you to handle it to the best advantage.

What sort of an outline should be prepared for comment from the Washington office?

Perhaps there is no categorical answer to that question. The most direct answer that occurs to the editor is: The sort of outline that will give the other fellow a fairly good idea of (1) the scope of your study; (2) the relative importance of your various findings as you see it; and (3) how you propose to present data, deductions, and conclusions to make them most convincing to the reader.

Specifically, the editor would advise:

1. A prefatory statement, telling the importance of this study in your own region, to what extent the results can be considered definitive, and giving your recommendations as to the form of publication and the distribution of the printed report.

2. An outline showing the main sections of the report in heading form, but with the matter under the main headings outlined in rough-sketch form, something like the chapter headings in Victorian novels.

3. Definite indication of the number of typewritten pages to be devoted to the respective sections or important subsections; or at least clear indication of the relative size of the different sections.

4. Parenthetical reference in the outline to tables, charts, and illustrations, as these will be brought in.

5. A list, with titles or descriptions as complete as possible, of all tables, charts, and photographs that are to be used. If possible, it will be an advantage to submit prints or file numbers of photos and at least rough sketches of charts with the outline. This may save you trouble later, as well as time in redrafting of charts, consideration of additional photos, etc.

In general, it is probably strictly true that no time or effort is saved, but rather much of both wasted, in the hurried preparation of a meager outline. That reports apparently highly successful can be and have been written without the preparation of an outline is probably quite true, and proves nothing. Columbus arrived at the New World by depending upon an assortment of instruments and charts to which not even old Joshua Slocum himself would entrust his welfare. The "rule o' thumb" has its place even today, but not among scientific men.

DENDROLOGY

Examination of West Point Trees: In 1911 Olmsted Brothers, landscape architects of Brookline, Mass., made a planting and grading plan for the military academy grounds, and accompanied them with a general discussion of the need of improving landscape features in various parts of the reservation. The whole reservation includes about 3,000 acres, which consist of an artificially improved portion devoted to space for the various academy buildings, parade and other open grounds, roads, and walks, and of a much larger, unimproved portion, more or less covered with forest and woodland.

Not being able to interpret Olmsted Brothers' plan and instructions satisfactorily, the officer in charge of buildings and grounds, Col. E. J. Timberlake, decided that the academy should have a trained forester who would be able to carry out Olmsted Brothers' instructions. Accordingly the newly appointed forester submitted a planting plan to the West Point authorities for approval, which was not approved. Evidently extreme caution is an attribute of these officials; who doubtless believe in the trite old maxim, "Be sure you're right and then stop and find out what's the matter."

Sudworth spent two days in a careful examination of the situation, and in a final conference presented a detailed plan of procedure, which is now being carried out.

Critical Review of "Trees for Roadside Planting"

The Bureau of Plant Industry, through its Office of Horticulture, is soon to issue a companion bulletin to "Planting the Roadside," reviewed a year ago, under the title "Trees for Roadside Planting," by F. L. Mulford.

An attempt is made to subdivide the United States into 32 different regions. Each region is defined on the basis of its average rainfall and general similarity of climatic conditions. Certain native and exotic trees are recommended for planting in each region, including about 40 different species. Trees native to eastern United States are freely commended for planting both in different parts of the Rocky Mountain and Pacific slope regions, based on known trials and on other available information. The selection of trees that will grow successfully in the East is comparatively easy, because of the relatively abundant rainfall. But in the Great Plains Region and the desert sections the picking of dependable trees for roadside planting is difficult because of deficient rainfall and high temperatures. Without irrigation very few, if any, desirable roadside trees can survive. Even with irrigation assured the high summer temperatures greatly limit the number of suitable trees.

Careful consideration was given to these difficult regions and many suggestions were made to the author for improving his recommendations of trees for these trying situations.

Federal Horticultural Board Activities

The Japanese beetle situation is constantly growing in seriousness. Despite every effort to limit the spread of the destructive pest, brought to this country in earth about the roots of Japanese iris, the insect is annually widening its hold on territory in Pennsylvania and New Jersey. Because the insect attacks practically all sorts of farm and horticultural crop plants, and because it defies ordinarily effective insecticides applied to the foliage of these plants, the control of this pest is rendered extremely difficult and for the most part ineffective. In Japan this pest has long since ceased to be a menace to crops because of the development of parasitic insects which attack both the larval and adult forms, thus reducing the reproduction of the pest so greatly as to make it a negligible enemy to agriculture and horticulture.

The Board has imported from Japan and "planted" a number of the more effective parasites in the infested areas here. Measurably destructive effects are already being observed in certain localities, and it is certain, as this mode of attack is extended, that it will be the chief source of relief.

In the meantime the advance of the insect has extended to a number of large nurseries in the vicinity of Philadelphia. At first the invasion of these nurseries required stopping the shipment of all evergreens to points outside of the infested territory, since such stock can be shipped only with a ball of earth about the roots, and this soil is known to carry the Japanese beetle larvae. Deciduous nursery stock which can be moved free of earth is allowed to go to outside regions.

Stopping the movement of evergreens resulted in a tremendous trade loss because most of the nurserymen did an enormous business in these plants with outside States, some of which were quick to quarantine Pennsylvania and New Jersey against earth-carrying plants. Notwithstanding the certainty of conveying the insect through these shipments, the nurserymen clamored to be allowed to continue shipment, which the Board could not permit in safety to the country at large.

Fortunately, however, the Board has discovered and perfected a process by which evergreen stock can be treated in the nursery and rendered safe for shipment. This treatment resulted from many different experiments with chemicals carried on for over a year. In March, 1925, complete freedom was given to nurserymen to ship evergreen stock to outside points.

The treatment consists in inclosing the required volume of earth about a tree necessary to be "balled" for safe shipment, with a circular metal sheet, into which a given quantity of emulsified carbon di-sulphide and water is poured and allowed to stand for from 12 to 24 hours. The liquid saturates all parts of the earth ball and kills all Japanese beetle larvae within the mass.

It has been long known that carbon di-sulphide forms a gas that is deadly to most insects. The problem was, however, to find a medium through which this chemical could be cheaply applied to the earth and of sufficient strength to kill insects and yet not strong enough to injure the roots of the trees. The actual quantity of carbon di-sulphide required is very small. It was then necessary to find an emulsifier which could be used in combining in suspension the carbon di-sulphide with a large amount of water, which is necessary to produce complete saturation of the earth ball. The chemist employed on this problem at last discovered an emulsifier which effects complete permanent suspension of the carbon di-sulphide in the water.

Through thousands of trials on earth masses "planted" with Japanese beetle larvae, and on the infested earth about trees, this treatment was proved to be 100 per cent efficient before it was allowed to be applied to commercial nursery stock. It is now applied by nurserymen only under the constant supervision of the Board's inspectors.

LAKE STATES FOREST EXPERIMENT STATION

May brought to completion one of the first of the larger investigative projects started by the Station after its establishment. The yield study for jack pine has now been completed, and the following tables are in final shape and, as soon as approved by the Washington office, will be available for distribution.

1. Volume tables:
   - Total volume in cubic feet
   - Merchantable volume in board feet, International and Scribner rules
   - Number of trees of different diameter per cord
   - Number of logs per thousand, International and Scribner scales.

These tables have been worked out separately for Minnesota sandy and rocky soils and for the Upper and Lower Peninsulas of Michigan, and for Wisconsin.

2. Yield in cubic feet and cords:
   - Total stand 1 inch and up--
     - Total height of average tree
     - Diameter breast high of average tree
     - Basal area per acre (square feet)

Number of trees per acre
Total unpeeled volume - cubic feet
Mean annual growth - cubic feet
Merchantable stand 4 inches and up--
Basal area per acre (square feet)
Diameter breast high of average tree
Number of trees per acre
Unpeeled volume - cubic feet
Mean annual growth - cubic feet
Unpeeled volume - cords
Mean annual growth - cords
Yield in board feet:
Stand 6 inches and up--
International log rule
Mean annual growth
Stand 7 inches and up--
Scribner log rule
Mean annual growth - board feet

3. Yields of understocked stands in percentages of normal yield tables. These still remain to be put in final shape.

The early spring enabled the Station to start the field work early in May.

Brown has now been for some time on the Minnesota National Forest laying out sample plots, in cooperation with the Forest Supervisor, for determining the best methods of cutting in jack pine and aspen types. Kittredge has joined him there and, in company with Ward Shepard and H. H. Chapman, is assisting in deciding on the principal features of this study.

A tentative plan is being worked out with the local representative of the Weather Bureau at Duluth for special fire weather forecasts for Minnesota. If results justify it, it is planned to extend this service to the other two States. The punching of the fire study punch cards for Minnesota and Michigan has at last been completed, and the first lot of cards has been shipped to Washington for tabulation.

Zon spent the early part of May with E. A. Sherman, E. J. Tinker and C. A. Hoar at Cloquet and in the Upper Peninsula of Michigan in going over areas suitable for National Forest purposes under the new acquisition law. Later in the month he spent several days at Madison attending the conference on the investigative program of the Forest Products Laboratory, at which Clapp and Shepard were present. On May 19 he gave an illustrated talk on "The Forest as a Plant Community" before the graduate students and faculty of the University of Chicago, at which representatives from the Departments of Botany, Geography, and Zoology were present.

As the result of the passage of the forest tax law in Michigan, the Station has been asked to assist in working out rules and regulations for listing land under the new law, particularly with reference to defining what kind of forest growth on cut-over land makes it eligible for listing.

J. F. Preston, a visitor, was interested in the possible sources of spruce supply in Minnesota for his company's mill in Pennsylvania. He looks upon northern Minnesota as the best region for growing spruce.

Dr. J. S. Boyce stopped at the Station on his way to England, where he is to study the diseases of Douglas fir. A point of interest to the Station, brought out by him during his visit, was the control of white pine blister rust in the scattered stands of white pine and sugar pine on the Pacific Coast. Since the Lake States have very little pure stands of white pine, it occurring largely in mixture with Norway pine and hardwoods, there is a point of similarity in the methods of control of the rust in the two regions.

CLOQUET FOREST EXPERIMENT STATION

The month was spent largely in caring for the nursery work. Shipment of nursery stock has been completed for the season and transplant work is virtually finished. Owing to a very early spring, it was possible to start work in the nursery two weeks in advance of any previous season. Approximately one-quarter million trees were shipped this spring, largely to private individuals and to county and municipal organizations. The Station joined with the State Forest Service in supplying evergreen trees for the children of the Twin City schools for planting exercises during American Forest Week, also for demonstration planting in the Upper Peninsula of Michigan by county agents.

The pressure of nursery work and other administrative duties has somewhat curtailed the amount of investigative work carried on. However, it was found possible to establish a few experimental plots of popple cuttings in the cutting area of 1925. This area had a rather heavy growth of underbrush, much of which was removed during the course of logging. Whether or not the jack pine and spruce will reproduce on this area before the brush gets a start is a question. It was thought that it might be possible to subdue the brush by planting fast-growing species of popple and if these succeeded in subduing the brush, they could be underplanted at a later date with Norway or white pine.

An experiment in the study of spacing in planting work is also being initiated. Four one-fourth-acre plots are being laid out, one using a spacing of 4x4, one 6x6, one 8x8, and one 10x10. The arboretum was enlarged by the addition of five plots. One plot of ironwood, one of white birch, one of golden willow, one of hawthorn, and one of horse chestnut.

A 65-foot flag pole has been erected in front of the office building. This fills a long-felt want. An entrance portal, similar to the one erected at the north entrance of the Station, is being erected at the south entrance.

The spring has been exceedingly dry and the fire hazard very great. However, the Station was fortunate to escape any serious fire trouble. One small fire crept over on the Station area, burning over about 4 acres which had been burned in 1918 and again in 1924. This brings out the fact that a plowed and disked firebreak is badly needed on the west boundary of Section 36. At present the firebreak simply consists of a cleared area on which all the brush has been cut and burned. A growth of grass and weeds, however, makes it possible for any ground fire to cross the firebreak. Prompt action by the Station force and the Minnesota Forest Service prevented the fire from assuming serious proportions.

NORTHEASTERN FOREST EXPERIMENT STATION

Active field work on several of the station's major projects started in May, Behre, Westveld, and Meyer being in the field during the latter part of the month. One job which is taking considerable time this year is the remeasurement of permanent sample plots established in this region by the Service back in 1905 and 1906. A large number of the plots established at that time were turned over several years ago to various forest schools and State forestry departments, but a considerable number were left for maintenance by the Service. These plots, some of which do not appear to have been remeasured since 1915 and 1916, are being brought up to date this spring. They involve for the most part studies in methods of cutting, natural reproduction, and thinning, and are located chiefly in Connecticut, New Hampshire, and Vermont.

Office work continued, particularly during the first part of the month, on all of the main projects. A start was made on coding the 1924 forest fire records for Massachusetts. In connection with minor projects, work was done on the hemlock and the chestnut replacement plots at Mount Toby.

Behre gave an illustrated talk on the work of the Forest Service before the Men's Club of South Hadley, Massachusetts, during the month, and Meyer gave a similar talk at New Haven, Connecticut.

APPALACHIAN FOREST EXPERIMENT STATION

General

Early in the month we moved our quarters to light, airy rooms on the sixth floor of a new building of modern fireproof construction. Visitors will now find us at Room 610, New Medical Building, Walnut and Market Streets, Asheville.

All bids so far received for the building of the field laboratory have been so high that it begins to look as though the station will have to purchase the supplies and employ labor directly. A capable foreman has been retained for the month of July. In the meantime plans are being drawn up and a trench for a water pipe line has been dug to a spring some 800 feet from the building site.

Frothingham and Korstian visited B. H. Stone, forester for the Pfister & Vogel Land Company at Blairsville, Ga., on May 11-15, to inspect the cooperative plantings of spruce on Brasstown Bald and to consider further investigations in the region. Trips were made with Stone and his rangers to various points in the 60,000 acres of timberland owned by the Pfister & Vogel Company. This territory lies north of the Blue Ridge and includes a number of spurs from the Blue Ridge and interior mountains. The company's holdings adjoin or are near both the Cherokee and the Nantahala National Forests. The mountains are covered with hardwood forests of good quality, especially thrifty in the rather large area of lower slope which has reverted to forest from cultivation. There are many excellent stands of second-growth hardwoods in which yellow poplar is present in quantity. The presence of the Georgia Forest School Camp about seven miles from Blairsville gives promise of cooperation in investigative work, but the Station's crowded program makes it unlikely that any member of the staff can be spared for work there during the present season.

Frothingham attended a dinner of the Western Carolina Lumber and Timber Association at Asheville, May 2, and spoke on hemlock lumber exploitation in western North Carolina.

Methods of Cutting (Mc-2)

To determine the relation of fire to the regeneration of yellow poplar, McCarthy marked out two sample plots at Bent Creek last month, and these were clear cut during May. These plots are in the Bent Creek bottomlands, one on land which was burned last April, the other on an unburned area across the creek.

These plots will furnish data for the fire study, the yellow poplar study, and the study of methods of cutting under which designation they have

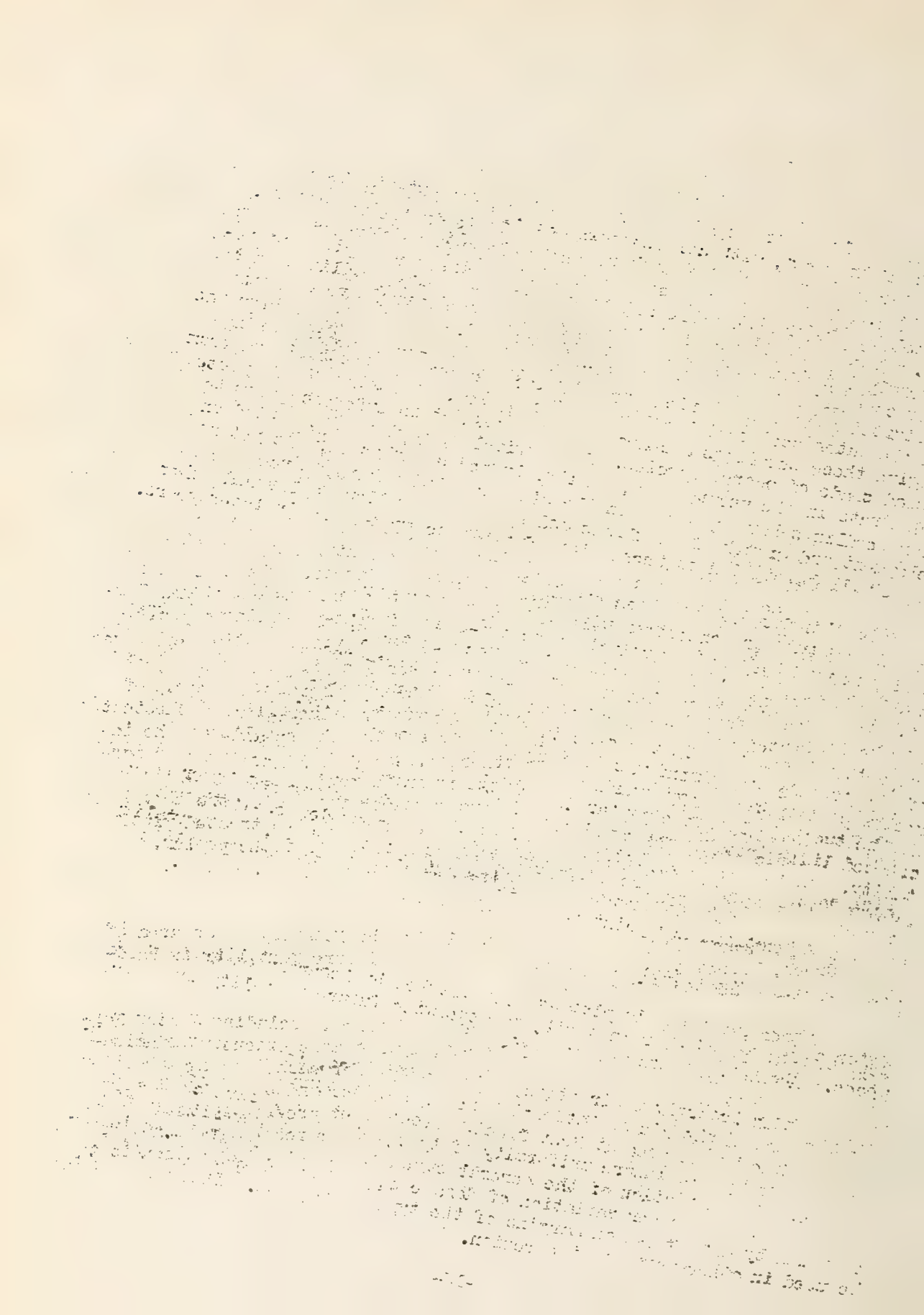
been placed. Quadrats were laid out on them to the extent of about 20 per cent of the area, with corresponding controls in the uncut stand. That poplar reproduction starts abundantly after light fires is a common observation. At the time the stand (almost entirely red maple) was removed and the quadrats established there were no poplar seedlings on the ground. Since then thousands have appeared on the burned area. These have germinated from seed more than one year old. The 1924 seed crop was largely consumed or killed by the fire and the seedlings now appearing have started from seeds buried one-half inch or more in the soil and from which the outer seed coat has largely decomposed. Clearing of the plots will give these seedlings a chance to grow without interference from the overhead shade of poorer species. No survival of poplar is expected on the quadrats in the uncut stand, whether burned or unburned. As yet no poplar seedlings have appeared on the clear cut but unburned area. The development and growth of seedlings and sprouts of yellow poplar and other species will be studied on these plots during the summer and in later years.

Frothingham and Korstian examined the permanent plots laid out in the fall of 1923 in connection with the study of natural and controlled development of hardwood reproduction on cut-over areas. These plots lie on a bench near the base of Lookingglass Rock in the Pisgah National Forest. The site was chosen because of its high forest-producing capacity and the fact that the history of the results of previous cutting and fire are better known than is the case in most other localities. The object of the present experiment was to free an abundant subordinate growth of yellow poplar from heavy overhead shade of sumac, silverbell and chestnut. In the treated plots the poplar is already showing the results of the increased light in the more rapid growth rate, greater vigor and lower mortality. In the control plots the crown cover is very dense. Although yellow poplar seedlings are still coming up under the shade, the mortality is much greater and the growth rate is slower than in the treated plots and the indications now point to an early shading out of the poplar.

Fire Damage Study (Pf-4)

A permanent sample plot was established by McCarthy on an area of Bent Creek, burned over in April, to determine future mortality in hardwoods. About 250 trees were tagged.

Under McCarthy's direction, a party of three, including Junior Forester Quick of the Pisgah National Forest, began a more extensive examination of the burned area at Bent Creek. Records for each five chains of strip were kept to insure uniformity of type, site, and severity of fire damage. This variation of the general strip system previously used is expected to show greater variation of damage since the results will not be confused by data taken on margins of the type, site, etc. This plan is to be used in other parts of the region.



Insect Studies

Dr. Craighead, in charge of the Division of Forest Insects in the Bureau of Entomology, spent several days starting several projects in the Bent Creek section. Mr. R. A. St. George will be in charge of this work during the summer.

A sample plot in which the pines were tagged in the study of fire damage, was examined and record made of the insect damage on 250 trees. This will enable us to determine more specifically the cause of mortality.

An experiment was also started to determine the relation of moisture to bark beetle attacks. By the use of waterproof shelters and ditches the amount of moisture available to the tree will be determined. These trees are located in a stand of old field pine at the crest of a flat ridge.

Work was continued on a project to determine the time of infestation of several species of trees by insects. Trees are cut and girdled at 15-day intervals.

SOUTHERN FOREST EXPERIMENT STATION

General

Forbes spent all of this month in the Washington office, assisting in the work of the Office of Forest Experiment Stations and conferring with members of the Service and other units of the Department in Washington. Shivery and Demmon visited the Washington office.

Hadley addressed the Southern Cypress Association at its annual meeting on the 20th. The main point in his talk was the need of financial cooperation for the continuance of the second-growth tupelo study, which we have had to temporarily abandon on account of lack of funds.

Protection

Fire. The seedlings in the Roberts plots were recounted and remeasured. Loss from last fire was small because last year's growth of grass was much less than usual. The leaf spot disease was very effectively checked by last summer's drought. Hine burned the three plots in the loblolly pine study, and although there was but one year's accumulation of needles the fire was fairly hot.

Grazing. Results of the 1924 fall and 1925 spring examinations of the McNeill grazing quadrats were worked up into shape for permanent record by Hadley. The excellent seed crop of 1924 resulted in the germination of as high as 50,000 seedlings per acre on some quadrats, showing very significant correlations. Although the project began as a grazing study it is yielding information on all factors, including fire, influencing the establishment of natural reproduction.

Management

The extensive survey crew spent the first half of the month in North Carolina on this project. No more field work will be done until the fall, but the data collected will be worked up and punched on cards during the summer months. While in Washington, Forbes and Demmon were initiated into the working of the punch card and sorting machines and worked out the application of the machine system to these surveys.

Hine made a recount and remeasurement of seedlings in reproduction study at Urania. Quite a few pine seedlings are starting this spring, which is the first crop since the fall of 1921. The large number of hardwood seedlings which came in last spring died during the summer's drought. A recount and remeasurement was made of the small natural reproduction areas for loblolly, longleaf, and shortleaf on the Greeley Pasture at Urania. Very heavy losses resulted from last summer's drought, and shade and competition of larger trees killed many. Vigorous seedlings of three years survived very well.

Naval Stores

Wyman received a good deal of assistance this month from Byrne and Wakeley. The second dip at Powell's (longleaf pine) showed the slow response of the narrow streaked group (low faces) and the continued high yield from the medium chipping which again exceeded the wide chipping. The shallow chipping continued to increase and the three-quarter inch deep chipping made a good gain. The dense stand group also yielded better than at any other dipping since the first one in 1923.

The second dip at Sampson Lake (slash pine) showed a very high yield from the shallow faces, and the open group gave a relatively good yield. The narrow faces (25%) yielded well, while the wider ones fell off as did the deep chipping.

Reports submitted to the Washington Office during May, 1925

"The Growth and Yield of Second-growth Tupelo in Southern Louisiana," by E. W. Hadley.

ROCKY MOUNTAIN EXPERIMENT STATION

A large part of May was spent at the Fremont field laboratory by both Roeser and Bates.

Bates completed the potting of 700 trees for a more comprehensive test of the transpiration of seven species.

The weather having changed, and normal precipitation having fallen for the first month since May, 1924, Roeser spent a few days filling in the yellow pine plantations made last year, since the stock of this species becomes very difficult to handle if left too long in the nursery.

The spring has been an unusually warm one, and this, together with the opportunities for food storage last season, when little new growth was made, probably accounts for the extraordinary flowering of Douglas fir and spruce trees, as well as all early-flowering perennials. The cone counts on Douglas fir this year, therefore, promise an unusual seed crop, with little likelihood of damage by bad weather from now on.

Anent the possibilities of tree-breeding studies, and some possible misconception as to their "intensely technical" character, an example which has attracted our attention during the month will tend to show that such studies need not be unduly technical nor of such slow progress that we need fear entering upon them. Two years ago Roeser and Bates noted and marked two young specimens of yellow pine very noticeable among their fellows for their straight, slender stems and absence of heavy

branches. These were in an area where repeated pruning has been made in an attempt to eradicate mistletoe, but in which examination this spring indicates practically every pruned tree still infected or re-infected. The two special trees mentioned above are entirely free of mistletoe. One of the parents of these trees has been quite certainly located near-by, and still another old tree is eligible to a claim, at least. Three other youngsters of varying age have also been found within a small radius. The important point is that every one of the trees showing this very desirable form is entirely free of mistletoe. In any way you may look at it, we undoubtedly have here a mistletoe-resistant strain. Since it has also become evident that the area can only be cleaned up by cutting of all trees now bearing mistletoe, the plan was at once decided upon of making such a cutting as would insure, essentially at least, cross pollination only between the individuals of "Strain A." This was accomplished by only the extra effort of a few hours of thought, the cutting serving our fuel needs as well as the general policy of putting the Station forest in the best silvicultural condition. If, within ten years, we can secure from the six or seven individuals of Strain A any appreciable amount of seed to make a demonstration and to create a still further seed source, who will say that such an effort at this time is not worth while? District 2 has conservatively 100,000 acres of mistle-infected yellow pine which can only be made productive by the introduction of such a strain. It is to the solution of such intensely practical problems as this that our efforts should be directed. If in so doing we prove or disprove anything regarding theories of heredity, so much the better.

A similar opportunity awaits us in the case of Douglas fir, except that the segregation of the mistletoe-resistant group will mean the waste of considerable material, since it is not accessible for fuel. Also, mistletoe in Douglas fir is not important over large areas. Consequently we can not accept this opportunity so readily. But "the woods are full" of such opportunities, if we would only keep such objectives in mind in connection with all other operations.

Three days were largely spent by Bates and Roeser in the effort to secure a complete series of light readings for the fourteen stations in operation under project T-1. The method employed was very successful, and the data show a minimum light value of 10-12% of the possible at the darkest spruce station, compared with nearly 100% at the south slope yellow pine stations. In view of the fact that any of our species will grow with 2% of full light, when other conditions are favorable, it is apparent that light deficiency must be only rarely a controlling factor in seedling establishment.

Bates, with several Pike and District office men, participated in a special meeting of the Colorado Mountain Club designed to give its members

a knowledge of Forest Service nursery and planting activities and a greater familiarity with our native trees. The interest shown by all was very encouraging and it is felt that the get-together will serve to give the Mountain Club a more sympathetic attitude toward the practical aims of forestry.

A final survey was made of the accomplishment in the tree-planting contest among the schools of eastern Colorado. There were but seven actual participants, but it is believed that their interest and the excellent showings so far made will lead to a bigger contest next year as well as a considerable amount of farm planting.

Practically all of the work which crowds the spring season is now out of the way, and the work in June will settle down largely to the routine of weather and soil-moisture observations, the transpiration study, seed tests being made in connection with yellow pine extraction methods, etc.

Bates will leave on the 8th for the Pacific meeting of the A.A.A.S., stopping en route in D-1, and on the return trip in Districts 5 and 4. A very interesting schedule has been arranged which will give at least a skeletal conception of the forests and problems of these other districts. Return will be made early in July.

SOUTHWESTERN FOREST EXPERIMENT STATION

Krauch has spent practically the entire month on the Lincoln establishing sample plots in Douglas fir. These plots were laid out two years ago, but final establishment has been delayed because of slow progress in cutting. Five methods of cutting are represented. They are as follows: scattered seed tree, shelterwood, diameter limit, light selection and heavy selection. Seedling plots laid out and counted last summer and again last fall show almost a total loss of 1924 seedlings.

A problem which for several years has been growing in importance is in regard to acceleration after cutting. Measurements at breast height show a very pronounced widening of the rings in trees in the near proximity of stumps. The question has been raised as to whether a proportional acceleration takes place all along the stem. If the taper increases greatly, measurements at breast height would show a higher rate of growth than actually takes place. A logging operation on an area partially cut when the Santa Fe Railroad was built between 35 and 40 years ago furnished an excellent opportunity to investigate this question. Measurements were obtained at the end of each log on some 85 trees. Although the data have not been compiled in sufficient detail to show the net results, it is evident that pronounced acceleration does take place throughout the stem. The amount of acceleration is variable. Sometimes it is greater on the last log than at breast height, although usually the relation is reversed.

DISTRICT 5

Show's time during May was spent in the office on a variety of work. Some additional time on the Timber Growing and Logging Practice, California Pine Region; work on the short edition of the Role of Fire, to be known as Fire and the Forest; final review of a paper on weather and fire relationships; work on the circular on logging damage and silviculture; and a lot of minor and routine work tells the story. Show also prepared a paper for a symposium at the Portland meeting of the A.A.A.S.

Dunning completed the volume tables on which such an enormous amount of work has been necessary, finished a progress report on the Massack methods of cutting plots, and did some work and reading on growth predictions.

Distribution of the Role of Fire continued rather slowly as help was furnished. School teachers in the mountain counties are the latest group to be reached. Post card returns have been very satisfactory, as high as 20 per cent of the canvassed having requested the bulletin.

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

Like April, May has been a month of continuous field work for everyone.

McArdle spent the entire month in the State of Washington with the two Douglas fir yield study crews. One new man, M. C. Collins, from the University of California, arrived on the tenth of the month to complete the second crew. There are now seven men in the field on this project. Together, the crews measured this past month 228 plots, in 29 tracts, comprising 86-1/8 acres. In addition to the plots, 120 chains of empirical strip cruise were run. During the month several tracts were taken on soil types which had not yet been sampled. The region to be covered is so large and the soil and climatic types so varied that we are beginning to feel that even 2000 plots are scarcely enough to serve as a basis for a good yield table.

Mr Ardle is spending two-thirds of his time looking up tracts and arranging the itinerary of the two crews. This gives him a chance to meet many timbermen, wardens, etc., and to make excellent contacts for the Station. Owners are very generally interested in knowing what their logged-off lands will produce.

Munger visited each of the yield study crews during the month, and saw some areas of a somewhat new type to him in extreme northern Washington, where alder plays a prominent place in the life history of the younger second growth stands.

During the month an unusually large western red cedar was found and was accurately measured by one of the yield study crews. Its dimensions are:

Diameter at 3 feet from ground ..... 18½ feet
" " 8 " " " (above butt swell) 15 "
Circumference at 3 feet from ground ..... 58½ "
Height -- 200 feet

This giant of the forest stands in a grove of trees, most of them over 8 feet in diameter above the butt swell. By this time the near-by logging operation has doubtless reached these trees and one more veteran has passed on to the shingle mill.

The first part of the month Munger took Mr. J. G. Eddy and Mr. Lloyd Austin of the recently started Eddy Tree Breeding Institute up to Wind River. Mr. Eddy is a successful lumberman of Everett, Washington, who is keenly interested in reforestation, particularly by artificial propagation, and Mr. Austin is a trained fruit tree breeder, recently an instructor at the University of California Agricultural College. They were much interested in the Nursery, Douglas fir seed study plantations, and the Arboretum. This is the beginning of what we hope will be close and mutually helpful cooperation with this privately financed undertaking to develop more rapid growing strains of forest trees. Mr. Austin started a little work at Wind River by partially ringing some young Douglas firs in the hope of stimulating early cone production. He also tagged several extra large individuals in the transplant beds to follow their development. Miss Wertz went to Wind River at the same time to check over the property.

Munger gave a talk at the Oregon Fire Wardens' annual conference in Salem May 4 and 5, and then went to Corvallis where he had some interviews with the Agricultural Experiment Station specialists as well as the forestry faculty and Mr. James Jardine. A trip was made to the Forest School's recently acquired 341 acres of forest, where they hope to put in some research work and demonstrations and an 80-acre arboretum.

From there Munger went to Oakridge, which has been strongly proposed as a good center of work for the Oregon Cascades and on further consideration seems as well suited as any one place. The next day with N. G. Jacobson, research officer of the Western Forestry and Conservation Association, he went over the logging works of the Booth-Kelly Lumber Company, which is one of the research clients of the Western Forestry and Conservation Association. The company has recently switched from a policy of cutting everything, conky trees, snags and all, to an almost opposite extreme of leaving a good many conky trees and the snags.

The report resulting from the analysis of the summer rainfall records in western Oregon and Washington was written by the Director and copies sent to the various protective agencies. Working plans for a couple of minor studies which are being conducted by the Forest force were prepared and sent out, one dealing with the establishment of permanent plots, to get a record of the survival of seed trees in Douglas fir timber sales, and the other a survey of the number and character of snags left after logging on private lands.

Simson was at Wind River the entire month, except for a couple of days he was in the Portland office. He has been building and installing equipment to get ready for fire studies, in addition to current meteorological studies. He was in on the broadcast slash burning on the Wind River Lumber Company sale at the close of a period of low relative humidity at 2.30 p. m., May 16. At the time of firing the humidity had reached 60 per cent, but the twigs and branches of slash had a moisture content of only 10 per cent. Previous to firing a light breeze of only 1 mph. obtained but as soon as the fire gained headway a wind of 9 to 12 mph. developed and the vertical draft was terrific. However, anemometer readings on all sides of the fire showed a drainage air current of 3 mph. blowing toward the center of the fire. This aided in confining the heat to the slash area and the net result was a very quick, intense fire and a satisfactory burn, except for the loss of some seed trees. Owing to the moist condition of the duff only about an inch of it was burned away so that reproduction may be expected without the doubtful aid of seed trees.

Simson has installed a weather substation in mature forest near the Station. Relative humidity and temperatures are being recorded, precipitation and duff moisture being measured. It is interesting to note that following several days of very dry weather, of .55 inches of rain which fell over a period of 24 hours, only .10 inches of it fell to the ground under the mature forest. That the trees would hold the other .45 inches seemed almost unbelievable, yet on the following day out of a rainfall of .17 inches only .02 inches was measured in the forest - a loss of approximately 88 per cent.

Isaac spent the first part of the month at Wind River measuring the thinning check plots in the sapling stands of Douglas fir, and doing some current maintenance jobs. Then he went to Oakridge, on the Cascade Forest, where the Experiment Station has taken over the current examination of the Douglas fir germination and survival plots put in by Hanzlik on the big Western Lumber Company sale. Isaac examined these, put in other series of reproduction quadrates, and is now installing some large plots in freshly felled areas to test seed tree survival.

NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

A very satisfying piece of field work engaged in by Weidman and Kempff this month was the marking of three half-acre plots for thinning - satisfying because it dealt with the sort of intensive silvicultural practice that is all too little a part of even a research man's work. The marking was carried on in a 70-year-old western white pine stand containing the usual mixture of white pine, larch, Douglas fir, cedar, and several other species. The thinning was done in connection with an existing project in which four plots were established 10 years ago, according to the following plan: One plot to be a check; another plot to be thinned heavily in one operation; another to be thinned mediumly in two operations 20 years apart; and still another to be thinned lightly in three operations at intervals of 10 years. The last-mentioned plot was one of those marked at this time.

One of the surprising findings of last fall's remeasurement of this thinning project was that practically no increased growth has taken place as a result of the thinning operations 10 years ago. The logical conclusion is that either the heaviest thinning operation was not heavy enough, or that thinning was done too late in the life of the stand (60 years). Increment borings showed that current annual growth had fallen off at 50 years. To be sure that the lack of response in increased growth was not due to insufficiently heavy thinning, one of the plots established at this time was marked considerably heavier than any of the existing plots. The aim was to take out all the suppressed trees, most of the intermediates, and a considerable share of the co-dominants. The third plot put in at this time was marked by a modified Borggreve method, taking out the largest dominants and such of the suppressed trees as have no chance of living until the next felling operation in the stand. Before it was undertaken, the Borggreve method was considered with some hesitation because of its radical feature of thinning from above. It was found, however, that the typical young western white pine stands of this age, when looked at from the standpoint of thinning, seem to lend themselves better to the Borggreve method than any other method of thinning. The usual condition on good sites is to have a dense stand of five or six species in which the bulk of the stems per acre are in a general co-dominant crown level, with a number of large dominants standing 25 or 30 feet above the general crown level. Although the latter trees are not strictly wolf trees, they are very large dominants. If it were not undesirable to coin a new term, they might very well be called super-dominants. It is really good silviculture to take these out and allow the remaining stand to develop as a more uniform and profitable crop of timber. In the plot marked by this method there were 38 trees per acre of this class which would make railroad ties and sawlogs.

After nearly a month at the Priest River Branch, during which he started seasonal measurements of forest fire conditions, Gisborne returned to Missoula May 8. Considerable difficulty was experienced in calibrating our 11 duff hygrometers, so that when several of them were placed close together under actual field conditions there was little variation of the duff moisture content revealed by the instruments. Three of the duff hygrometers are now in position at Priest River and one at Savenac Nursery. The others are to be placed later on the Clearwater, Nezperce, and Flathead Forests. Of the three thermo-hygrographs recently received for use in the fire studies, one has been installed at Savenac Nursery and the other two will be installed on the Clearwater and Nezperce Forests.

Haig spent part of the month on an analysis of the available material bearing on the application feature of our white pine yield study. After trying a number of leads, he has come to the conclusion that much more field data is necessary before usable factors of application can be secured. A small amount of time was spent on a preliminary check of District 1 white pine volume tables. In addition to this, a survey of all the available yield data was made to ascertain in what age classes and localities the yield study should be conducted this summer. Likewise, a survey of sale areas and methods-of-cutting practice on them was made to help in planning the field work and itinerary of the methods-of-cutting study.

Wahlenberg installed three new experimental plantations this spring. The first is a test of top-pruned 1-2 yellow pine stock for which 1200 trees were planted in April. The second is a test of different degrees of winter injury to 1-2 yellow pine for which 1600 trees were planted. The third is a test of 1-2 white pine on all different aspects of the clean burn of 1924 on Big Creek of the Lolo Forest. It consists of three lines extending up and down the sides of many draws tributary to the main creek, and involved the planting of 7850 trees. The results of this work should round out the study of white pine in relation to aspect and assist the planting organization by indicating how far crews should be permitted to plant over changes in aspect without a change of tree species.

In the nursery 95 small plots were installed to test the effect of various fertilizers on yellow pine and spruce. These are not expected to show results clearly until the fall of 1926. Two beds testing the zinc sulphate weed treatment on freshly-limed soil were installed. The chemical treatment is also being tried on transplant rows for the first time this spring. One plot was sown to Japanese larch (Larix dahurica japonica) with seed matured in Finland.

At the Priest River Branch Kempff spent about 10 days on the thinning project, part of the time with Weidman marking three of the sample plots. As a result of cooperative arrangement with the Biological Survey, E. B. Perkins and the county agent, W. Thomas, spent three days with Kempff in exterminating pocket gophers and Columbia ground squirrels near the station. The work on pocket gophers was done on a 10-acre plantation where the chief experimental project is a test of stock from various sources of yellow pine seed in the United States. This plantation was in imminent danger of being destroyed by the activities of the gophers. The extermination work on Columbia ground squirrels was done on 60 acres of Jurgen's Flat, where there are old plantations of yellow pine, white pine, and Engelmann spruce, and where it is intended some time to develop an arboretum. The control measures seem to have been quite successful, although it is possible that the pocket gophers will need another treatment next fall or spring.

It is interesting to mention that on May 21 the record-breaking rain for a 24-hour period was recorded at the Priest River Branch. The total precipitation for that period amounted to 2.16 inches!

Our vacancy is to be filled in the middle of June by the assignment of Junior Forester Robert Marshall. Marshall, who was at the Pacific Northwest Station last summer, is to work with Haig during the field season.

Manuscript News Notes

District 5

Timber Growing and Logging Practice in the Redwood Region. S. B. Show (Dept. Bulletin).

Yield Capabilities of the Pure Yellow Pine Type on the East Slope of the Sierra Nevada in California. S. B. Show (Jour. Agri. Res).

Growth and Yield of Western Yellow Pine. W. H. Gallaher. (J.A.R.)

Fire and the Forest. S. B. Show and E. I. Kotok. (Dept. Cir. to printer.)

Weather Conditions and Forest Fires in California. Show and Kotok. (Galley proof. Dept. Cir. 234.)

District 4

Soil Acidity and Tree Growth. F. S. Baker (Jour. Agr. Res.)

Lake States

Timber Growing and Logging Practice in the Lake States. (R. Zon (Dept. Bul.)

Harvesting the Timber Crop on the Cloquet Experimental Forest. T. S. Hansen. (To Lbr. World Review.)

Soil Building and Soil Destruction. J. A. Mitchell (To Parks and Recreation.)

Pioneering in the Station Ford. A. E. Wackerman (Development Bureau News.)

District 6

A Study of Growth on the East Side Unit. H. D. Foster. (J.A.R.)

National Forests of the North Pacific District. J. V. Hofmann.

Appalachian

Exposure Factors for Forest Photography. F. W. Haasis (To American Photography.)

Northern Rocky Mountain

Stimulation of Engelmann Spruce Growth at Savenac Nursery. W. G. Wahlenberg (Progress Report).

Western Larch Nursery Practice. W. G. Wahlenberg (J.A.R.)

Field Survival Studies, An Investigation of Factors Influencing Survival in Forest Plantations During Dry Years and on Dry Sites. W. G. Wahlenberg (Progress Report.)

Washington

The Use of Liability Ratings in Planning Forest Fire Protection. W. N. Sparhawk. (Page Proof J.A.R.)

In Print

Hine, W. R. Hogs, Fire and Disease vs. Longleaf Pine (Southern Lumberman. May 2, 1925.)

Gisborne, H. T. Using Weather Forecasts for Predicting forest fire danger. Mon. Weather Review, February, 1925.

Larsen, J. A. Forest Fire Seasons at Different Elevations in Idaho. Mon. Wea. Rev. Feb. 1925.

Stockbridge, H. E. Bibliography on Technique of Volume and Growth Studies (Mimeographed).

Stockbridge, H. E. Selected List of Articles on Plant Breeding. (Mimeographed.)

Korstian, C. F. Some Ecological Effects of Shading Coniferous Nursery Stock. Ecology, Jan. 1925.

Wahlenberg, W. G. Sowing and Planting Seasons for Western Yellow Pine. Jour. Agric. Res. Feb. 1, 1925.

Zon, Raphael. The Work of the Lake States Forest Expt. Sta., Minnesota Horticulturist, May, 1925.